

Examples of physical barriers include the skin, mucus and hairs.

Examples of chemical barriers include stomach acid and lysozymes (which cleave bacterial cell walls)

The immune system

The immune system uses two types of white blood cell: phagocytes and lymphocytes.

Phagocytes consume pathogens and digest them in a process called phagocytosis. This is a non-specific response (they can consume any pathogen).

Lymphocytes (specifically B-lymphocytes) are a type of white blood cell that is specific. They contain a receptor on the outside which is complimentary to a protein spikes (known as antigens) present on all pathogens. These antigens are specific to each pathogen and therefore each type of B-lymphocyte can only target a certain pathogen. When the B-lymphocyte detects the antigen, it produces antibodies, which bind onto the antigens of the pathogen, inhibiting reproduction. The antibodies bind onto other antibodies, clumping together to speed up phagocytosis.

Memory lymphocytes

Memory lymphocytes are used to speed up the response when a disease returns. The body produces memory lymphocytes naturally when a disease is encountered. These remain in the body much longer than B-lymphocytes. When the antigen is detected again, it triggers the body to produce the B-lymphocytes which are complimentary, allowing for a faster response.

Immunisation

Immunisation is the process of injecting a deactivated version of a pathogen or the antigen present on it to trigger an immune response. This allows the body to produce memory lymphocytes without the person feeling ill.

Monoclonal Antibodies (Higher tier only)

Monoclonal antibodies are produced from lots of clones of a B-lymphocyte. They are beneficial because they reproduce much faster than B-lymphocytes do. They are created from the B-lymphocyte specific to the pathogen and a myeloma (tumour) cell. This creates a hybridoma, a cell which triggers an immune response whilst also reproducing very quickly.

These can be used for pregnancy tests, using the antibodies with blue beads. These antibodies are complimentary to HCG, found in pregnant women. When HCG is present, the antibodies bind to them. The strip contains an antibody complimentary to this antibody (an anti-antibody). If the HCG is present, the antibodies will bind to the